

ANNEXURE A

Technical Specification for Installation of the Smallbore Steel Pipe Wastewater System at the Alrode and Witbank Transnet Pipelines Petroleum Products Storage and Handling Facility.

REVISION: 04

GLOSSARY

Abbreviations

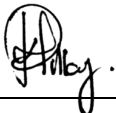
AIA	- Approved Inspection Authority
ALR	- Short Code for Alrode Station
NDT	- Non-Destructive Testing
OHSA	- Occupational Health and Safety Act
PPE	- Personal Protective Equipment
P&ID	- Process & Instrumentation Diagram
QCP	- Quality Control Plan
SANS	- South African National Standards
SHE	- Safety, Health and Environment
SOP	- Standard Operating Procedure
TPL	- Short Code for Transnet Pipelines
WIR	- Short Code for Witbank Station

Definitions

<i>Contractor</i>	- Successful tenderer
<i>Employer</i>	- Transnet
Pr. Eng	- Registered Professional Engineer with ECSA
Site	- The area of the Works
Works	- Refers to the full scope of supply and services

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1 TECHNICAL REQUIREMENTS

1.1 OVERVIEW OF TECHNICAL SPECIFICATION

This technical specification is for the supply of all required material and equipment, and installation of fully functional pump systems for discharging wastewater from the spill basin/oil separator to the sewer lines at Transnet Pipeline's Alrode and Witbank stations. This shall include, but not limited to, the procurement, storage, fabrication, factory testing, delivery to TPL site, off-loading, excavation, core drilling, welding, installation, site testing and quality control of the complete works. The project is predominantly Mechanical, but shall include Process, Civil and Electrical Engineering works. The *Contractor* shall provide an experienced, qualified, efficient, and effective team of resources and equipment to carry out the works.

1.2 DESIGN AND DETAILED DRAWINGS

The systems shall consist of but not limited to pump sets (pump and motor), piping, valves, fittings, supports, meter, control equipment and interface with the existing installations – refer to attached reference drawings and P&IDs consisting of the existing and proposed systems for the respective stations. The reference drawings & P&IDs accompanying this document were prepared by TPL Engineering and are intended to be used for tender purposes and shall aid in planning and pricing. The sub-sections to follow will give a background of the existing and proposed systems, and technical scope summary for each station. Any further clarity required will be given at a compulsory site briefing to be held at the TPL Alrode Station.

1.2.1. ALRODE STATION

BACKGROUND OF EXISTING INSTALLATION

The Alrode station has an existing installation, which includes various piping routes, an electric motor, and an emergency stop, which have been partially dismantled over the years. Figure 1 below shows the current layout of the existing system.

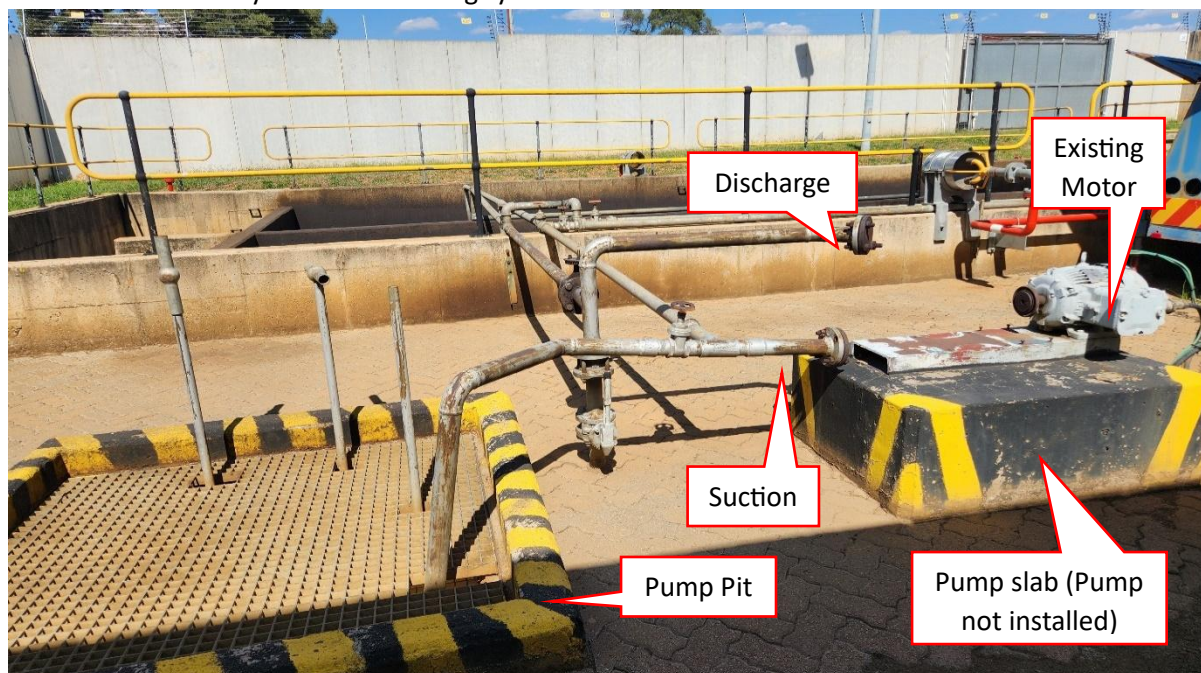


Figure 1 Existing Alrode pump system layout

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The pump suction line (pump currently not installed) branches from three locations, with one stemming from the pump pit, one from the middle compartment of the spill basin and the other from the road tanker offloading bay. The existing pump discharge line branches and connects to the manifold sump, road tanker loading bay and aeration line.

The sewer manhole is situated on the adjacent/far side, outside of the station which is +/-200 m away from the spill basin and shall require 3-inch piping. TPL Engineering has already determined an expected path for routing piping. Refer to drawings '**ALRODE SPILL BASIN SEWER CONNECTION PIPING DRAWING-A0, A2, A3 & A4**' for detailed layouts prepared by TPL Engineering. These layouts are accompanied by a P&ID titled '**Alrode Oily Water System (RevB)**' which indicates the expected process flow of the overall system.

The pre-determined piping route as shown on the layouts indicate that the piping shall be mounted along the wall with cantilever piping supports. There are several obstructions which are 2 x entrance gates (big one for vehicles and smaller one for pedestrians) as shown on the layouts, and 2 x fire emergency boxes as well as a clear view wire fence that the pipe will need to go through. These shall be removed, modified, avoided and/or relocated elsewhere by the appointed *Contractor* as stipulated in the summary of works.

SUMMARY OF WORKS

The complete system to be supplied and installed by the *Contractor* shall include but not limited to the following:

- 1.2.1.1 A new pump set capable of a flowrate of approx. 30m³/h or as close as possible while using the same electrical infrastructure – Existing motor shall be removed and replaced with a new pump and motor set mounted on existing skid base, including a check of hydraulics and sizing of hydraulic dependant components. Allowance to be made to have a discharge orifice plate manufactured and sized, once TPL have confirmed allowable discharge flow rate during execution. The *Contractor* to recommend pump set as per supplied datasheet, see '**ALR Spill Basin Pump Datasheet**' for details. The following shall be taken into consideration:
 - A. The existing motor is rated at 7.5 kW and 15.4 Amps.
 - B. The *Contractor* to test the existing electrical and control cabling in accordance with **the Latest SANS 1507-1 & SANS 10142-1**
 - C. The Start-Stop Stand design shall be fabricated as per attached drawing '**G52001-L4001-P933 -A3**' and the Instrument Stand as per '**T4000-P106_Rev1.1_Press Gauge**'.
 - D. The *Contractor* shall use on the existing LV MCC – **+18LV01.5F3** bucket - see Single Line Diagram '**G52001-L4018-S899-A1**' for more information.
 - E. A direct online motor control is provided. - see Single Line Diagram '**G52001-L4018-S135(1.0)-A3**' for more information.
 - F. A local start-stop station shall be supplied and installed next to the motor - see Single Line Diagram '**G52001-L4018-S135(1.0)-A3**' & '**G52001-L4001-P933 -A3**' for more information.
 - G. The new Motor shall be Ex 'd' rated (Explosion proof) and shall have a minimum degree of protection of IP 55, Temperature T4.

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- H. The cable to be sized as per **Latest SANS 10142-1**.
 - I. A Factory Acceptance Test (FAT) to be performed, with Factory Test protocol submitted to the TPL Project Manager's for Approval.
 - J. Cable specification and labelling to be in accordance with **PL727-Cabling, Racking, Trenching & Earthing Installation Codes of Practice**.
 - K. Earthing and Bonding should be in accordance with **Latest SANS 10142-1 & SANS 60079-14**.
 - L. The *Contractor* is responsible for familiarising themselves with the following standards to meet TPL's design criteria and ensure the motor-pump set complies with acceptable design standards. Understanding these standards is crucial for acceptance:
 - I. PL 631-Specification for Low Voltage Switchgear and Distribution Boards.
 - II. PL 666-Electrical Design Criteria.
 - III. PL 711-Specification for Equipment Cabinets to House Electronic Equipment.
 - IV. PL 727-Cabling, Racking, Trenching & Earthing Installation Codes of Practice.
 - M. The Site Acceptance Test (SAT) is required for the commissioning of the complete motor starter installation.
 - N. The *Contractor* shall provide a Supplementary CoC for this installation as per **SANS 10142-1** with all supporting documentation.
- 1.2.1.2 A new 3-inch galvanised suction line piping from the clean water compartment approx. 20 m long that shall be connected to the existing 2-inch suction line from other compartments through to the suction side of the pump, including isolation gate valves, flanges, elbows, unions, reducers, foot valve and strainer basket around the foot valve. Where practically possible all connections to be screwed type and the use of unions to be adopted. A flanged mechanical water meter shall be procured and installed by the *Contractor*.
- 1.2.1.3 A new 3-inch galvanised discharge line from the pump to the main discharge sewer point, approx. 200 m away as depicted on drawing '**ALRODE SPILL BASIN SEWER CONNECTION PIPING DRAWING-A0**'. Piping shall be supported on the discharge side of the pump leading to the sewer manhole/tie in point, with cantilever piping supports placed along the wall with 3m spacing. Details for piping supports have been provided, refer to drawing '**ALRODE SPILL BASIN SEWER CONNECTION PIPING DRAWING-A4**'. Piping to include all unions and screwed/threaded type joints and connections, elbows, isolation gate valves, check valves and reducers where required.
- 1.2.1.4 A new ramp and reinforced concrete channel (30 MPa) for the discharge pipe to be routed across the vehicle entrance gate, channel details are indicated on the detailed drawings. This shall include removable heavy duty grating which shall be installed along the length of the channel of which piping will be routed at ground level. This channel shall have a span of approx. 5 m across the gate and shall be able to withstand the weight of a fully loaded road tanker/crane truck which weighs approx. 10 tonnes. The works shall include G5 compaction to maintain strength and levelness of the ground. See figure 2 below for the image of the vehicle access gate.

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Figure 2 Alrode Vehicle Access Gate

- 1.2.1.5 Removal of obstructions on the determined piping route along the wall. This includes 2 x fire emergency boxes which shall be removed and installed elsewhere on site (allow for 1m x 1m x 100mm concrete base and bolt box down). There is a clear view fence of which a hole shall be cut to make way for the piping and corrosion protection coating shall be applied on the cut section of the fence. There is also loose electrical cabling present which TPL personnel shall rectify and re-organize. See figure 3 below for image of the obstructions.

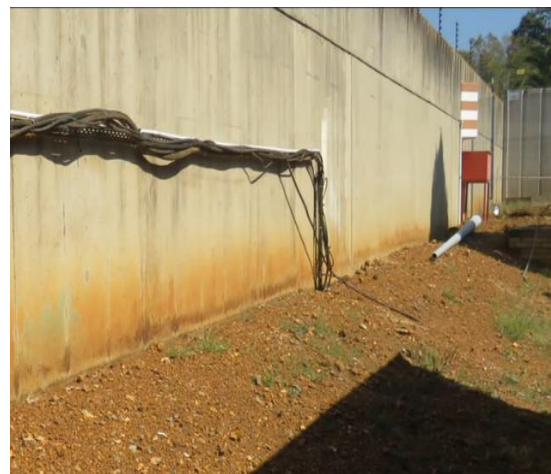


Figure 3 Fire Emergency Box (Left); Loose Electrical Cabling (Right)

- 1.2.1.6 A casted 30 MPa reinforced concrete U-channel for the discharge piping to bypass below the pedestrian access gate which is approx. 2m wide and installation of a metal welded grating at natural ground level. U-channel to be installed in front of gate and shall be open ended on either side and sloped slightly to one side to allow rainwater drainage. See figure 4 below for image of the pedestrian access gate.

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Figure 4 Alrode Pedestrian Access Gate

- 1.2.1.7 Discharge piping to exit premises after pedestrian gate, on the outside of the boundary wall after which the piping will enter underground approx. 300mm deep as close to the wall as possible and thereafter enter the manhole side entry below ground, see drawing **'ALRODE SPILL BASIN SEWER CONNECTION PIPING DRAWING-A0'** for details. The piping going underground and leading to the sewer manhole shall be 3" HDPE, this piping shall interface with the galvanized piping via an HDPE moulded flange adaptor with a 1.5mm gasket thickness. The *Contractor* shall make provision for all excavation works. Figure 5 below illustrates the general arrangement of the proposed connection to the sewer.

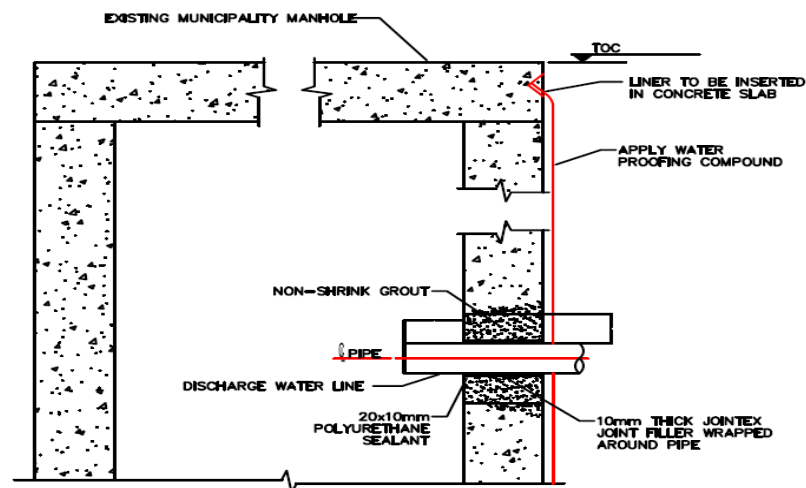


Figure 5 Discharge pipe underground connection to main municipal sewer manhole

- 1.2.1.8 Current storm water free drainpipe is approx. 18 inches, this free drains to the stormwater drainage system as per current design. TPL require this outlet to be valved with a 10-inch water application (submersible) gate valve for isolation and shall include an extended shaft with a handwheel to allow for operation at ground level or outside the spill basin. An 18-inch to 10-inch #150 flanged reducing adaptor shall be secured to the spill basin wall with chemical anchors with the gate valve bolted onto it. The adaptor is to be sealed against the spill basin wall and the gate valve to be supported below the valve.

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- 1.2.1.9 New 3-inch threaded isolation gate valves on suction, and discharge lines.
- 1.2.1.10 New 3-inch flanged Mechanical water meter to measure water discharged to sewer line.
- 1.2.1.11 Pressure indicator (1600 kPa) on discharge line including 3/8-inch piping and a gauge stand as per drawing '**T4000-P106_Rev1.1_Press Gauge (Instrument Stand)**'.
- 1.2.1.12 New 3-inch non-return/backflow prevention valve on the new discharge line.
- 1.2.1.13 New foot strainer and non-return valve on suction line.
- 1.2.1.14 New basket/cage around the foot valve to act as a secondary strainer. Detail for cage provided on drawing '**CAGE DETAIL-REV 1-A3**'.
- 1.2.1.15 New emergency start/stop system to replace existing obsolete system.
- 1.2.1.16 Procurement of 2 x 9Kg DCP SABS certified fire extinguishers with purpose-built cabinets on site. This shall also include mounted signage and placement shall be in close proximity to the pump.

1.2.2. WITBANK STATION

BACKGROUND OF EXISTING INSTALLATION

Witbank station has an existing makeshift/temporary installation, which includes flexible piping, and a pump set. Figure 2 below shows the layout of the existing system.

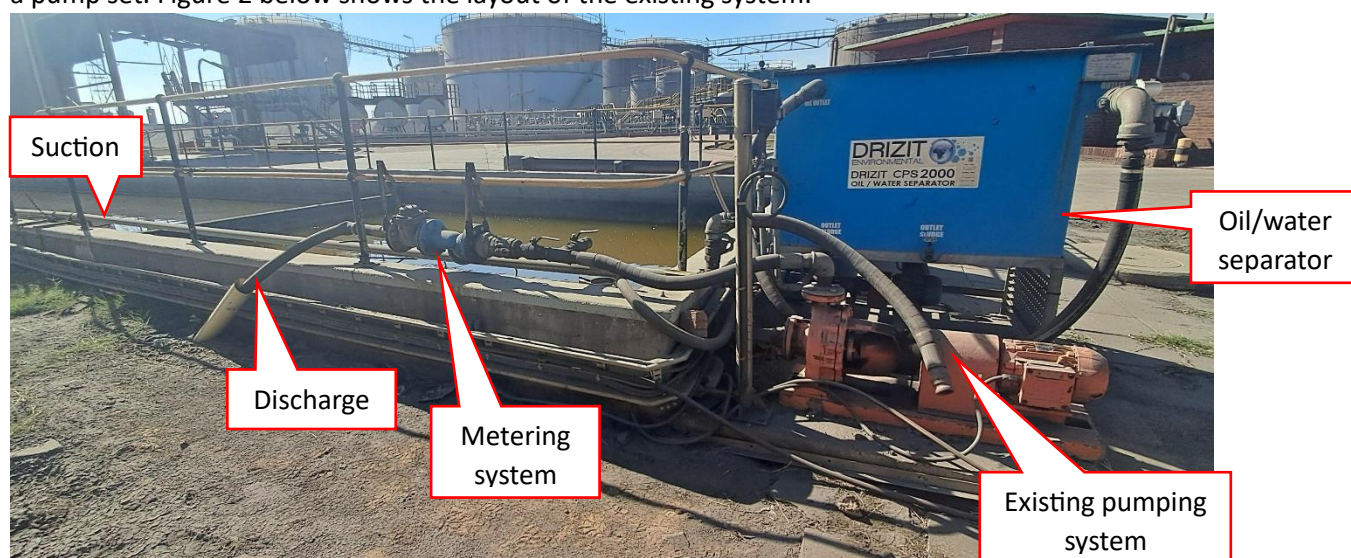


Figure 6 Existing Witbank pump system layout

The Witbank system has only one suction line from the spill basin's clean water compartment made of steel piping which will be re-used in the system to be installed. Drawing '**WIR NEW DESIGN REV B-A2 PL 122645 Sheet 2**' illustrates the proposed system. The existing discharge line is made of a combination of flexible hoses and PVC piping which discharges to the sewer connection on the outside of the station yard. The existing pump and motor shall be removed and replaced with a new pump and motor set on a skid base by the appointed *Contractor*. This new system is expected to achieve a flow rate of approx. 20m³/h.

The *Contractor* shall also construct a new manhole, remove the flexible piping, and replace with permanent galvanised 2-inch pipe routing to the new manhole. Construction of the new manhole shall include an HDPE piping connection teeing into the stations existing sewer line as shown in

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drawings '**WITBANK SITE LAYOUT PLAN-A2 PL 122645 Sheet 1'**. Refer to drawing '**WIR SPILL BASIN PIPING PL 122625 REV1'** for detailed layout prepared by TPL Engineering. The layout is accompanied by a P&ID titled 'Witbank Oily Water System' which indicates the expected process flow of the overall system. Further details are discussed in the summary of works below.

SUMMARY OF WORKS

The complete system to be supplied and installed by the *Contractor* shall include but not limited to the following:

- 1.2.2.1 New pump and motor set on existing skid base through rawl bolts - existing pump set shall be removed, and new pump with a flow rate to be approx. 20m³/h or as close as possible while using the same electrical infrastructure. The following shall be taken into consideration:
 - A. The existing motor is rated at 3 kW and 6.89 Amps.
 - B. The *Contractor* to test the existing electrical and control cabling in accordance with **the Latest SANS 10142-1**.
 - C. The Start-Stop Stand design should be as per attached drawing '**G52001-L4001-P933-A3'** and the Instrument Stand as per '**T4000-P106_Rev1.1_Press Gauge'** .
 - D. The *Contractor* shall use the existing LV MCC – **+27LV01.4F2** bucket - see Single Line Diagram '**U4027-S899-001_Rev1.0_SLD-A1'** for more information.
 - E. A direct online motor control is provided. - see Single Line Diagram '**G5200-U4027-S159(1.0)-A3'** for more info.
 - F. A local start-stop station shall be supplied and installed next to the motor - see Single Line Diagram '**G5200-U4027-S159(1.0)-A3'** & '**G52001-L4001-P933 -A3'** for more information.
 - G. The new Motor shall be Ex 'd' rated (Explosion proof) and shall have a minimum degree of protection of IP 55, Temperature T4.
 - H. The cable to be sized as per **Latest SANS 10142-1**.
 - I. A Factory Acceptance Test (FAT) to be performed, with Factory Test protocol submitted to the TPL Project Manager's for Approval.
 - J. Cable specification and labelling to be in accordance with **PL727-Cabling, Racking, Trenching & Earthing Installation Codes of Practice**.
 - K. Earthing and Bonding should be in accordance with **Latest SANS 10142-1 & SANS 60079-14**.
 - L. The *Contractor* is responsible for familiarising themselves with the following standards to meet TPL's design criteria and ensure the motor-pump set complies with acceptable design standards. Understanding these standards is crucial for acceptance:
 - I. PL 631-Specification for Low Voltage Switchgear and Distribution Boards.
 - II. PL 666-Electrical Design Criteria.
 - III. PL 711-Specification for Equipment Cabinets to House Electronic Equipment.
 - IV. PL 727-Cabling, Racking, Trenching & Earthing Installation Codes of Practice.
 - M. The Site Acceptance Test (SAT) is required for the commissioning of the complete motor starter installation.

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- N. The *Contractor* shall provide a Supplementary CoC for this installation as per **SANS 10142-1** with all supporting documentation.
- 1.2.2.2 Construction of a new manhole as per drawing **‘WITBANK SITE LAYOUT PLAN-A2 PL 122645 Sheet 1’** which shall include an HDPE piping tie in into the stations existing sewer line. Drawing to be read in conjunction with the following activities to be carried out:
- Excavate Manhole Trench Box approximately length 750mm x 1500mm x 1500mm.
 - Compact the in-situ material to 90% MOD AASHTO.
 - Apply HDPE liner at the bottom of foundation.
 - Construct reinforced concrete foundation slab (150 mm thick) with Mesh 617 single layer. Concrete Strength to be 25 MPa.
 - Supply 110 mm PVC gully trap.
 - Supply 110 mm PVC pipe.
 - Install 110 mm gully trap and 110 mm PVC pipe.
 - Connect 110 mm PVC pipe to an existing 210 mm PVC sewer pipe using a 110 mm-200 mm PVC Reducing WYE.
 - Construct a Manhole Cover with a cast iron grating fixed into the roof slab as indicated on the Drawing.
 - Apply HDPE liner externally on the manhole wall.
 - Pour concrete screed (10 MPa) to cover gully pipe and form Manhole Base.
 - Apply 20 mm plaster on the internal wall.
 - Apply a.b.e. cementitious waterproofing slurry (a.b.e. dura.slurry) to the internal wall.
 - Install manhole concrete cover.
 - Backfill and compact material surrounding manhole.
 - Remove concrete paving slab.
 - Recompact in-situ material to 95% AASHTO.
- 1.2.2.3 Construction of new bund floor and wall, refer to drawing **‘WITBANK NEW DESIGN-A2 PL122645 Sheet 2’**. The following activities shall be carried out:
- Cast a new Concrete Bund floor slab as indicated on the drawing.
 - Cast a new Concrete Bund wall as indicated on the drawing.
- 1.2.2.4 Install weep holes on the bund floor. New 2-inch galvanised pump discharge piping leading to new manhole. This shall require approx. 10m of galvanized piping, including supports. The piping shall enter the manhole aboveground as shown on drawing **‘WITBANK SITE LAYOUT PLAN-A2 PL122645 Sheet 2’**. The existing temporary supports for both suction and discharge lines shall be replaced with permanent supports for discharge and suction lines. Discharge line supports to be mounted on top of existing spill Basin Wall, and suction line supports to be supported on side of existing Spill Basin Wall as indicated on the drawing.
- 1.2.2.5 Remove Cat Ladder and relocate to new position as indicated on drawing **‘WIR SPILL BASIN PIPING PL 122625 REV1’**.
- 1.2.2.6 Removal and relocation of existing cat-ladder as indicated on drawing **‘WIR SPILL BASIN PIPING PL 122625 REV1’**.
- 1.2.2.7 New 2-inch screwed/threaded type isolation gate valve on discharge line.
- 1.2.2.8 Incorporation of existing water meter into the new discharge piping system - shall be kept above ground.
- 1.2.2.9 New pressure indicator on discharge line with a gauge stand as per drawing **‘T4000-P106_Rev1.1_Press Gauge (Instrument Stand)’** including tubing to connect pump and gauge.

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- 1.2.2.10 Allowance for minor civil works for the concrete base of pump and motor and removal and discarding of old base if required or use existing base and modify accordingly.
- 1.2.2.11 New emergency start/stop system.
- 1.2.2.12 Jet cleaning of TPL sewer piping to main municipal manhole outside the station's boundary wall.
- 1.2.2.13 Procurement of 2 x 9Kg DCP SANS 1910 certified fire extinguishers with purpose-built cabinets on site. This shall also include mounted signage, and placement shall be in close proximity to the pump.

1.2.3. DESIGN CONSIDERATIONS

- 1.2.3.1 The designs completed by TPL cater for the fluid being conveyed which is processed wastewater.
- 1.2.3.2 The *Contractor* shall determine the interfacing of the new design to the existing installation and structures as shown in the various drawings supplied.
- 1.2.3.3 The *Contractor* shall use supplied drawings prepared by TPL Engineering in order to tender for a lumpsum to complete all works.
- 1.2.3.4 The *Contractor* shall verify all physical measurements before fabrication and construction.

1.3 SUPPLY AND INSTALLATION

- 1.3.1. The *Contractor* shall be responsible for the full works which include supply, procurement, storage, fabrication, factory testing, delivery to TPL site, off-loading, excavation, core drilling, minor civil works (grouting, pump bases and supports), welding, installation, site testing and quality control.
- 1.3.2. The *Contractor* shall supply all components and materials as per approved design and also make provision for all tools and equipment required to carry out the works. TPL will not be responsible to supply any tools or machinery.
- 1.3.3. The *Contractor* and TPL shall perform a post installation quality inspection as part of commissioning the systems. The systems will also be pressure tested to the applicable pressures as informed by the design where applicable.
- 1.3.4. Any residual or remedial works required as a result of removing or installing any components shall be catered for by the *Contractor*.

2 APPLICABLE CODES AND GUIDELINES

Although not bound in nor issued with this document, the relevant codes, and guidelines, and municipal by laws are to be adhered to in the rendering of the scope of works. The *Contractor* is expected to have unrestricted access to, but not limited to, these documents as well as possess sufficient knowledge and expertise of the codes and guidelines contained within them.

CODES and LEGISLATIVE

Occupational Health and Safety Act 85 of 1993	Occupational Health and Safety Regulations, and Construction Regulations
Water Services Act 108 of 1997	Water Services Regulations

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API 610	Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries
API 682	Pumps - Shaft Sealing Systems for Centrifugal and Rotary Pumps
API 1104	Standard for Welding Pipelines and Related Facilities
ASME B31.3	Process Piping
City of Joburg & Emalahleni	Water and Sanitation Services By-law
SANS 10108	Hazardous Area Classification
SANS 10142-1	The Wiring of Premises – Low Voltage Installations
SANS 10111-1	Engineering Drawing Part 1
SANS 10044	Code Of Practice for Welding
SANS 121/ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods
SANS 1910	Requirements for the Supply and Maintenance of Portable Fire Extinguishers and Hose Reels
SANS 10400	Part P: Drainage
SANS 10089	Storage and distribution of petroleum products in above-ground bulk installations
SANS 10400 Part G:	Excavations
SANS2001-BE1	Earthworks
SANS2001-CC1	Concrete works
SANS2001-CM1	Masonry walling
SANS2001-CS1	Structural steelwork
SANS 10142-1	Wiring of a Premises Low Voltage Installations

TRANSNET PIPELINES DRAWINGS & SPECIFICATIONS

The following TPL Engineering Drawings, Technical Standards & Specifications shall apply. **Note that these documents form part of the tender pack.**

Detailed Drawings	ALRODE SPILL BASIN SEWER CONNECTION PIPING DRAWING-A0, A2, A3 & A4
Detailed Drawing	WIR SPILL BASIN PIPING PL 122625 REV1
Detailed Drawing	WITBANK SITE LAYOUT PLAN-A2 PL 122645 Sheet 1
Detailed Drawing	WIR NEW DESIGN REV B-A2 PL 122645 Sheet 2
P&ID	Alrode Oily Water System (RevB)
P&ID	Witbank Oily Water System
Single Line Diagram	G52001-L4018-S135(1.0)-A3 (Alrode)
Single Line Diagram	G52001-L4018-S899-A1 (Alrode)
Single Line Diagram	U4027-S899-001_Rev1.0_SLD-A1 (Witbank)
Single Line Diagram	G5200-U4027-S159(1.0)-A3 (Witbank)
Drawing	G52001-L4001-P933 -A3 (Stand Typical Start/Stop Drawing)
Drawing	T4000-P106_Rev1.1_Press Gauge (Instrument Stand)
Foot Valve Cage Detail	CAGE DETAIL-REV 1-A3
Datasheet	ALR Spill Basin Pump Datasheet
TPL Piping Specification	Piping Material Classes Specification

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TPL Standard	PL 100-Drawing Standards
TPL Standard	PL 101-Plant Equipment Tag Numbering Standard
TPL Standard	PL 102-Equipment, Instrument & Electrical Symbology Standard
TPL Standard	PL 103-General Drawing Standard
TPL Standard	PL 631-Specification for Low Voltage Switchgear and Distribution Boards
TPL Standard	PL 666-Electrical Design Criteria
TPL Standard	PL 711-Specification for Equipment Cabinets to House Electronic Equipment
TPL Standard	PL 727-Cabling, Racking, Trenching & Earthing Installation Codes of Practice

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